

Animal Keepers' Forum



ANIMAL BEHAVIOR INSTITUTE

ADVANCE YOUR CAREER & CONTINUE YOUR PROFESSIONAL EDUCATION **ONLINE!**

Our programs in **Zoo & Aquarium Science** and **Wildlife Rehabilitation** give you the training you need to grow and advance in your field.

Small class sizes and professional faculty guarantee you a personal education with the individual attention you deserve.

**START TODAY AND EARN YOUR CERTIFICATE
IN AS LITTLE AS SIX MONTHS!**

**learning
partner**

ASSOCIATION
OF ZOOS &
AQUARIUMS

Visit us at
www.AnimalEdu.com

Toll free
(866) 755-0448



ANIMAL
BEHAVIOR
INSTITUTE

a more personal education



ACCREDITED
BUSINESS



249 ABOUT THE COVER

250 FROM THE PRESIDENT

252 COMING EVENTS

223 ANNOUNCEMENTS

FEATURED ARTICLES

254-258

Location and Activity Preferences of Tigers Living in a Complex Habitat
Elana M. Kopel, Kim Daly-Crews and Dr. Lara Metrione

260-261

A Work of Passion
Dave Johnson

262-263

Hose2Habitat: Enriching the Lives of Captive Wild Animals and the People Who Care For Them

TRAINING TALES

264-267

From Hay Tubs to Bollards: The Evolution of Chute Training for Grevy's Zebra

CONSERVATION STATION

268-270

When a tiger roars in a forest and no one is around to hear it, does it make a sound?



Wake Up

To Quality, Value and Convenience!



Discover what tens of thousands of customers — including commercial reptile breeding facilities, veterinarians, and some of our country's most respected zoos and aquariums — have already learned: with Rodentpro.com®, you get quality AND value! Guaranteed.

RodentPro.com® offers only the highest quality frozen mice, rats, rabbits, guinea pigs, chickens and quail at prices that are MORE than competitive. We set the industry standards by offering unsurpassed quality, breeder direct pricing and year-round availability.

With RodentPro.com®, you'll know you're getting exactly what you order: clean nutritious feeders with exact sizing and superior quality. And with our exclusive shipping methods, your order arrives frozen, not thawed.

We guarantee it.

Order online!

www.RodentPro.com

It's quick, convenient
and guaranteed!

P.O. Box 118
Inglesfield, IN 47618-9998

Tel: 812.867.7598

Fax: 812.867.6058

E-mail: info@rodentpro.com



 **RODENT PRO**.COM®
MICE • RATS • RABBITS • CHICKS • QUAIL



MISSION STATEMENT

American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover photo was taken by Dave Johnson, a zoo keeper from Denver, Colorado and the founder of the Katie Adamson Conservation Fund. It is of a mother Greater one-horned rhino (*Rhinoceros unicornis*) and calf. Dave has led seven trips to Nepal for his community, calling their collaboration "Team Nepalorado". They visit with many Nepal communities and center their work in the Chitwan and Bardia National Park areas. Their work is considered a fusion of cultures in the name of conservation. They will be traveling again in November with eighteen excited animal nerds.

Since 2011, the population of these rhinos has increased in Nepal to 645, an increase of almost 200 individuals. When Dave and his fellow concerned travelers began embarking on this journey they were losing 10-12 rhino every year in Chitwan National Park. Now they have only lost one rhino in the last four years, and have several years with no poaching incidents of tiger, rhino, or elephant in their entire country. They are extremely proud of their global conservation status and have increased the protected area in their country to include almost 26% of the total land mass.

Dave has written three children's conservation books including one about a little orphan rhino they encountered back in 2010. Her name is Narayani and she is growing up at the Central Zoo in Kathmandu. In her honor they are trying to build a wildlife vet hospital in Chitwan National Park. This rhino species has been clawing its way back since a low mark of 200 animals back in the 1980's. With strong protection, community efforts, and buffer zone management the population has risen up to 3400 animals in Nepal and India, the only countries where they still roam in the wild.

Articles sent to **Animal Keepers' Forum** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for **AKF**. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

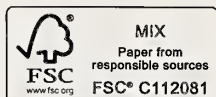
Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

Articles printed do not necessarily reflect the opinions of the **AKF** staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

Items in this publication may be reprinted providing credit to this publication is given and a copy of the reprinted material is forwarded to the Editor. If an article is shown to be separately copyrighted by the author(s), then permission must be sought from the author(s). Reprints of material appearing in this journal may be ordered from the Editor. Regular back issues are available for \$6.00 each. Special issues may cost more.

MEMBERSHIP SERVICES

Animal Data Transfer Forms available for download at aazk.org. AAZK Publications/Logo Products/Apparel available at AAZK Administrative Office or at aazk.org.



ANIMAL KEEPERS' FORUM

TO CONTACT THE AKF EDITOR:

Shane Good, AKF Editor
P.O. Box 535, Valley City, OH 44280
330-483-1104
Shane.Good@aazk.org

AAZK Administrative Office

American Association of Zoo Keepers
8476 E. Speedway Blvd. Suite 204
Tucson, AZ 85710-1728
520-298-9688 (Phone/Fax)

CHIEF EXECUTIVE/FINANCIAL OFFICER: Ed Hansen

E-mail: Ed.Hansen@aazk.org

DIRECTOR OF PROFESSIONAL DEVELOPMENT: Bob Cisneros

E-mail: Bob.Cisneros@aazk.org

ANIMAL KEEPERS' FORUM - EDITOR

Shane Good, Shane.Good@aazk.org

GRAPHIC DESIGNER

Elizabeth Thibodeaux, Elizabeth.Thibodeaux@aazk.org

ENRICHMENT OPTIONS COLUMN COORDINATORS

Julie Hartell-DeNardo, Heather Dunn

Casey Plummer, Dawn Neptune

TRAINING TALES COLUMN COORDINATORS

Kim Kezer, Jay Pratte, Beth Stark-Posta

CONSERVATION STATION COLUMN COORDINATOR

Lauren Augustine

ANIMAL WELFARE COLUMN COORDINATORS

Beth Ament, Pattie Beaven

BOARD OF DIRECTORS AND OVERSIGHTS

PRESIDENT: Penny Jolly, Penny.Jolly@aazk.org

Awards Committee

Chair: Jan McCoy, Jan.McCoy@aazk.org

Vice Chair: Denny Charlton, Denny.Charlton@aazk.org

International Outreach Committee

Chair: Yvette Kemp, Yvette.Kemp@aazk.org

Vice Chair: Adriana De Los Santos, Adriana.DeLosSantos@aazk.org

VICE PRESIDENT/Ethics Chair/Conference Manager: Bethany Bingham,

Bethany.Bingham@aazk.org

Professional Development Committee

Chair: Melaina Wallace, Melaina.Wallace@aazk.org

Vice Chair: Ellen Gallagher, Ellen.Gallagher@aazk.org

BOARD MEMBER: Bill Steele, Bill.Steele@aazk.org

Behavioral Husbandry Committee

Chair: Amanda Ista, Amanda.Ista@aazk.org

Vice Chair: Megan Wright, Megan.Wright@aazk.org

Bylaws

Manager: Jackie Wolfinger, Jackie.Wolfinger@aazk.org

Grants Committee

Chair: Jessica Munson, Jessica.Munson@aazk.org

Vice Chair: Amanda Ott, Amanda.Ott@aazk.org

Safety Committee

Chair: Kelly Murphy, Kelly.Murphy@aazk.org

Vice Chair: Sara Venable, Sara.Venable@aazk.org

BOARD MEMBER: Mary Ann Cisneros, Maryann.Cisneros@aazk.org

Bowling for Rhinos Program

Program Manager: Patty Pearthree, Patty.Pearthree@aazk.org

Vice Manager: Jim Haigwood, Jim.Haigwood@aazk.org

Conservation Committee

Chair: Christy Poelker, Christy.Poelker@aazk.org

Vice Chair: Janee Zakoren, Janee.Zakoren@aazk.org

Trees for You and Me Program

Program Manager: Christy Mazrimas-Ott, Christy.Mazrimas-Ott@aazk.org

Vice Manager: Anthony Nielsen, Anthony.Nielsen@aazk.org

BOARD MEMBER: Rachael Rufino, Rachael.Rufino@aazk.org

Communication Committee

Chair: Zachary Page, Zach.Page@aazk.org

National Zoo Keeper Week Program

Program Manager: Robin Sutker, Robin.Sutker@aazk.org



I used to love climbing trees when I was a kid. My sister and I would climb onto the top of the fence in our front yard and then up into a maple tree to talk or play with our plastic horses. We also had four giant pine trees in the back yard with branches like a ladder. We could climb up in them and no one could see us. Those trees made for grand adventures in our own backyard. Most of the time we do not think about it, but trees are a part of us and we are part of the forest. "A forest is much more than what you see," says ecologist Suzanne Simard.

Forests breathe, forests communicate and forests help us all. The American Association of Zoo Keeper's Trees for You and Me (TFYM) Program supports planting trees and helps restore forests. We need your help to revitalize habitats that are in need of reforestation. Some may be right in your own backyard!

Climate change is altering the world we all inhabit from birds migrating, oceans acidifying to the reduction of ice for polar bears. "Change the world. Let's make the world better than when we found it." - Bill Nye. Conservation actions that reduce the production of greenhouse gases are the most impactful. Planting trees is one of the few tools that we have to sequester carbon. Saving tropical rainforests is even more impactful for sequestering CO2.

Whether you like to hike in the woods or loved climbing trees as a kid, if you or your Chapter hasn't had a chance to donate yet, it is not too late to be a part of the forest!

Please donate by mailing a check to AAZK by November 1, 2016 or check the aazk.org website.

AAZK
8476 E Speedway Blvd.
Suite 204
Tucson, AZ 85710-1728

It is very important that in the memo line of the check it is noted Donation - TFYM

"Zookeepers don't just care for animals, they care for our planet and you can too."

Penny Jolly
Penny.Jolly@aazk.org



What's a Duty Selection?

Well first it is easier than trying to think of decimals, especially when there are so many variations.

Each Duty designation is unique to that particular part. In other words, all Medium Duty designations DO NOT share the same wall thicknesses. A Heavy Duty small part has a thinner wall than a Heavy Duty large part.



These two images are a great representation of variations. They were both manufactured in a Heavy Duty, however one weighs 60 pounds and the other weighs in at 9 pounds.



"Helping professionals mold enrichment"

sales@wildlifetoybox.com

(866) 793-0376

www.wildlifetoybox.com

COMING EVENTS

Post upcoming events here!
e-mail shane.good@aazk.org

October 1-5, 2016

Otter Keeper Workshop

Buffalo, NY

Hosted by the Buffalo Zoo

For more information go to:

otterkeeperworkshop.org

October 5-9, 2016

From Good Care to Great Welfare Workshop

Royal Oak, MI

Hosted by The Detroit

Zoological Society's Center for Zoo Animal Welfare

For more information go to:

<http://www.czaw.org/>

October 6-9, 2016

Advancing Bear Care 2016

Omaha, NE

Hosted by Omaha's Henry

Doorly Zoo & Aquarium

For more information go to:

www.bearcaregroup.org

October 10-14, 2016

Giraffe Care Workshop

Colorado Springs, CO

Hosted by Cheyenne Mountain

Zoo

For more information go to:

<http://www.cmzoo.org/index.php/giraffe-care-workshop/>

October 12-16, 2016

2016 Elephant Managers Association Conference

Oklahoma City, OK

Hosted by Oklahoma City Zoo

For more information go to:

<http://elephantmanagers.com/>

October 31 - Nov. 5, 2016

2016 International Gorilla Workshop

Guadalajara, Mexico

Hosted by the Guadalajara Zoo

For more information go to:

igw2016.wordpress.com

November 14-18, 2016

15th International Elephant & Rhino Conservation and Research Symposium

Singapore Zoo.

Hosted by Wildlife

Reserves Singapore.

For more information go to:

elephantconservation.org

March 26-31, 2017

AZA Mid-Year Meeting

Albuquerque, NM

Hosted by ABQ BioPark

For more information go to:

aza.org/conferences-meetings

April 23-28, 2017

ABMA Annual Conference

Cincinnati, OH

Hosted by Cincinnati Zoo and

Botanical Garden.

For more information go to:

theabma.org/abma-annual-conference/



September 19-23, 2016

**AAZK National Conference
Memphis, TN**

*Hosted by Memphis Zoo AAZK
Chapter and Memphis Zoo.*

MemphisZoo.org/AAZK-Conference

September 9-13, 2017

AZA Annual Conference

Indianapolis, IN

Hosted by Indianapolis Zoo

For more information go to:

www.aza.org/conferences-meetings

TREES FOR YOU AND ME

Has your AAZK Chapter participated in the 2016 Trees for You and Me (TFYM) Campaign yet? Why not? Polar bears are dealing with the warmest year on record. So far only a handful of AAZK Chapters have participated. If each AAZK Chapter would donate \$100 towards TFYM, we could reach our goal of a minimum of \$15,000 by 1 November which goes towards the TFYM grant recipient(s). We have 3 applicants for our first year of the TFYM Grant! The projects are "Cans for Corridors", "Planting Trees and Changing Lives in Kedougou Region, Senegal" and "Restoration of Critical Sandhill Habitat with Lake Louise State Park with the Planting of Longleaf Pine, Turkey Oak, and an Experimental Introduction of the Federally Listed Clasping Warea (*Warea amplexifolia*)". **For more info go to aazk.org/committee/trees-for-you-and-me.**



BFR and ZOO KEEPER CAREER BROCHURES

Thanks to the communications committee and AAZK, we now have Bowling for Rhinos Promotion brochures. These are great items to have available at your events or information booths throughout the year. Additionally, we also have zoo keeper career brochures for your career day events, and to help you answer questions for students and aspiring zoo keepers.

To order, please contact the AAZK office at 520-298-9688 or ed.hansen@aazk.org and give address, contact information and number of BFR brochures requested.

AAZK WELCOMES TWO NEW CONSERVATION PARTERS

The Foundation for the Conservation of Salamanders (FCSal) is dedicated to educating the general public about the great diversity of salamanders, and to providing key funding to salamander conservation projects. Started as Chopsticks for Salamanders, an initiative founded by three primary AAZK Chapters, the Greater Baltimore Chapter, The National Capital Chapter and the New York AAZK Chapter, FCSal has now expanded to a stand-alone non-profit organization with over 15 supporting AAZK Chapters! As a conservation partner of National AAZK, FCSal hopes to continue to raise money and support for salamander conservation through collaboration, dedication and persistence. To this end, FCSal has set aside the first Saturday in May to celebrate Salamander Saturday. The inaugural event, held 7 May 2016, was a huge success, with 25 events held across the United States and Canada. Salamander Saturday events should be catered to each organization's strengths and schedules; it can be as simple as hosting an education table, or as involved as a fundraising event. If your zoo or AAZK Chapter wants to host a Salamander Saturday event, contact info@fcsal.org for more information. Visit FCSal online at FCSal.org and like us on Facebook at [Facebook.com/ChopsticksForSalamanders](https://www.facebook.com/ChopsticksForSalamanders). **To read even more about FCSal, see the Conservation Station column about this new organization in the August 2016 issue of the AKF.**



AAZK also welcomes the new Conservation Partner Hose2Habitat, the only organization in the world whose mission is to improve the physical and psychological well-being of captive wild animals by providing and enhancing habitat enrichment for animals in zoos, sanctuaries, and other facilities through the donation of recycled and other materials, workshops, programs, and services. **To learn more about Hose2Habitat, see their Featured Article on pp. 262-263 of this issue.**

Location and Activity Preferences of Tigers Living in a Complex Habitat

Elana M. Kopel, Senior Mammal Keeper, Jacksonville Zoo and Gardens, Jacksonville, FL

Kim Daly-Crews, Intern, South-East Zoo Alliance for Reproduction & Conservation, Yulee, FL

Dr. Lara Metrione, Research Associate, South-East Zoo Alliance for Reproduction & Conservation, Yulee, FL

Abstract

Jacksonville Zoo and Gardens opened Land of the Tiger, an innovative tiger habitat that included two traditional exhibits as well as a trail system. Land of the Tiger is the first zoo habitat to include this type of a pathway system for big cats. The Zoo's goal for the trail was to allow the animals to move out of the traditional exhibit areas and choose whether to be closer to the public and other species, or out of view of both. To understand how the tigers actually used the new habitat, space utilization was investigated during one-hour observation sessions four times a week for four months. One female and one male Sumatran tiger (*Panthera tigris sumatrae*), and three male Malayan tigers (*P. t. jacksoni*) had rotating access to different portions of the habitat, including land and water features in the traditional exhibit spaces and multiple trail features (glass walkway, bridge, fig tree, bamboo node, corridors, and intersecting nodes). The frequency and duration of behaviors, including grooming, investigating, locomoting, marking, playing, resting, and pacing, were recorded within each unique area of the habitat, and these were analyzed in proportion to the total time that the tiger spent in that area. Overall, the tigers spent a larger proportion of time in the trail than in the traditional exhibits ($p < 0.05$). The tigers used the trail as both a pathway and a destination, as no significant difference was detected in the proportion of time that tigers spent simply locomoting through the trails compared to the amount of time they spent engaged

in other behaviors in the trails ($p > 0.05$). In fact, tigers spent a greater proportion of time in the trail compared to the traditional exhibit spaces performing behaviors perceived as positive (investigating, locomoting, marking, playing and resting) ($p < 0.05$) and those perceived as negative (pacing) ($p < 0.05$). This study demonstrated preference for the trail system over the traditional exhibit spaces of the tiger habitat at Jacksonville Zoo and Gardens. Data suggest that efforts should be made to give each of the tigers access to the trail system as often as possible.

Figure 1. One of the traditional tiger exhibits featuring areas of faux rock, water and plants. Photo credit John Reed, John Reed Photography.



Introduction

In March 2014, the Jacksonville Zoo and Gardens opened Land of the Tiger, a complex habitat with the goal of offering its tigers choices for space and feature utilization. Wild tigers roam widely in a diversity of habitats including rainforests, grasslands, riverine corridors, and rocky country, and they may use caves or dense vegetation for dens (Nowak, 1999).

Therefore, to mimic a more natural landscape, the habitat at Jacksonville Zoo and Gardens included two traditional exhibits comprising grassy areas, some faux rock areas, and waterways with soaking areas (Figure 1). The exhibits were connected by an off-exhibit holding building, as well as a 204-meter (670 foot) complex trail system (Figure 2). Additional unique features were located within this trail system, including bridges, a mock strangler fig tree with built-in platforms, and corridors that



Figure 2. Diagram of the exhibit at the Jacksonville Zoo and Gardens indicating the traditional exhibits and how the trail system allows the tigers to choose to move in relation to conspecifics and prey species.

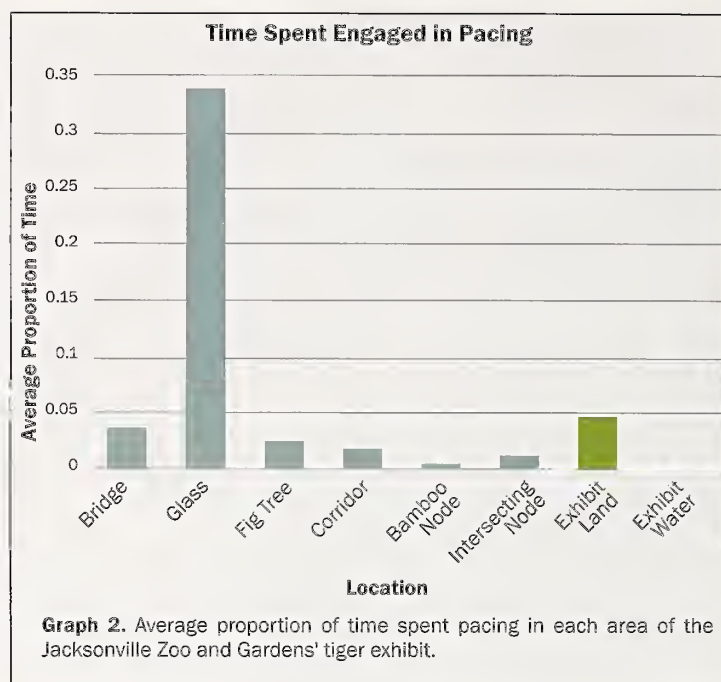
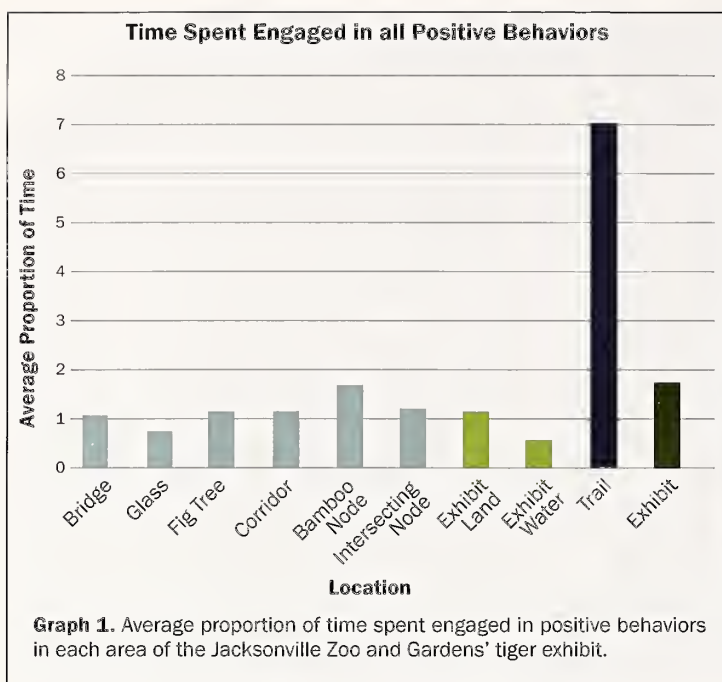
provided alternative vantage points. This combination of features was intended to allow animals to choose their proximity to the public, the keepers, other tigers and other species, including babirusa (*Babirusa celebensis*) and Asian small clawed otters (*Amblonyx cinereus*).

Cats in managed care frequently engage in stereotypical locomotor patterns when they are active (Resende et al., 2014) and when they are unable to reach a goal. Some consider this abnormal behavior an indicator of stress (Pitsko, 2003). Shepherdson et al. (2013) found that pacing, one such stereotypy, was associated with high concentrations of adrenal hormones associated with the stress response. Jacksonville Zoo and Gardens' expectation was that the trail system would give the tigers the opportunity to control their environment by moving toward and away from various physical and social situations, and the ability to patrol their habitat, ideally decreasing the tendency for stereotyped pacing.

In this study, we investigated whether the tigers spent more time in the traditional exhibit or trail spaces, in which location pacing (a perceived negative behavior) occurred most, and where they performed behaviors perceived more positively, such as grooming, investigating, locomoting, marking, playing and resting. Following from the expectation that the trail system should facilitate movement toward or away from physical and social opportunities, we hypothesized that the trails would be used as pathways to get from one point to another rather than as destinations, thus the tigers would engage in non-stereotypic locomotion in the trails more than they performed other behaviors in the trails. As a result, we also hypothesized that the tigers would actually spend more time in the traditional exhibit space where we expected them to perform more of the other positive behaviors like grooming, investigating, marking, playing, and resting. Findings of the study were intended to inform husbandry decisions so that tigers could be allowed more time in the areas of the complex habitat where they participated in more positive behaviors.



Figure 3. Picture of the view from the glass bridge, which allowed the tigers in the trail to see into adjacent tiger areas and to be above the public. Photo credit John Reed, John Reed Photography.



Methods

Animals and Housing

All observations were conducted at Jacksonville Zoo and Gardens. Three male Malayan tiger (*Panthera tigris jacksoni*) littermates, born in 2011, were exhibited in pairs at the start of the study. After the third week of observations, it was necessary to exhibit one of the brothers individually. For the remaining two brothers, half of the observations were conducted while they were paired and half of the observations were conducted while they were exhibited individually. All further observations of the third brother were conducted while he was exhibited individually. A breeding pair of adult Sumatran tigers (*Panthera tigris sumatrae*), born 2001 (1.0) and 2011 (0.1), were observed individually except when paired for breeding. During observations, the focal tiger(s) always had access to at least one traditional exhibit area (1700 or 1980 m²; 5600 or 6500ft²) comprised of a water feature, grassy areas, and faux rocks, and as much of the trail (204 m; 670 ft) as possible without sharing an adjoining partition with a tiger of the other subspecies. There was usually another tiger(s) in the second traditional exhibit area that could be seen but not physically accessed by the focal tiger. The trail allowed the cats to walk through corridors enclosed in chain link fencing behind each traditional exhibit and behind an adjacent exhibit housing prey species (babirusa and Asian small clawed otters). Two portions of the trail, a bridge and a glass walkway (which had a floor made out of glass, as well as windows looking into one of the tiger habitats), allowed tigers to move over the public. The fig and bamboo nodes were respectively 3.35- and 4-meter (11 and 13 foot) diameter spaces in the trail where the tigers were on display close to the public. The fig contained platforms at varying heights, and the bamboo node provided a shaded, more hidden area. The intersecting nodes were concrete areas between the trail corridors where shift doors were located for changing the configuration of the trail.

Observations and Data Analysis

All data were collected between 17 Oct 2014 and 27 Feb 2015 using focal animal, continuous sampling (Altmann, 1974). Observations were conducted four times a week for one-hour observation periods by three trained observers. Inter-observer reliability was confirmed using Kendall's W ($p < 0.05$) on two consecutive trials prior to starting data

collection. The frequency and duration of 12 behaviors were recorded, including pacing, grooming, investigating, locomoting, marking, playing and resting, which were included in the final analysis. The location of each behavior also was recorded, including Corridor, Bamboo Node, Fig, Glass Walkway, Bridge, Intersecting Node, Exhibit Land, and Exhibit Water.

To assess where tigers spent more of their time overall, the total time that a tiger spent in each area was divided by the total amount of time that the tiger had access to the area. In addition, for each tiger in each area, the duration of each behavior was summed and divided by the total amount of time that the tiger spent in the area. These proportional data were used in two tailed t-tests to assess significant ($p < 0.05$) differences between the use of exhibit areas and trail areas in total, and the difference between locomoting versus all other behaviors ("destination behaviors") for the assessment of whether trails functioned as pathways or destinations. Pacing was analyzed as a perceived negative behavior, and grooming, investigating, locomoting, marking, playing and resting were analyzed together as positive behaviors.

Results

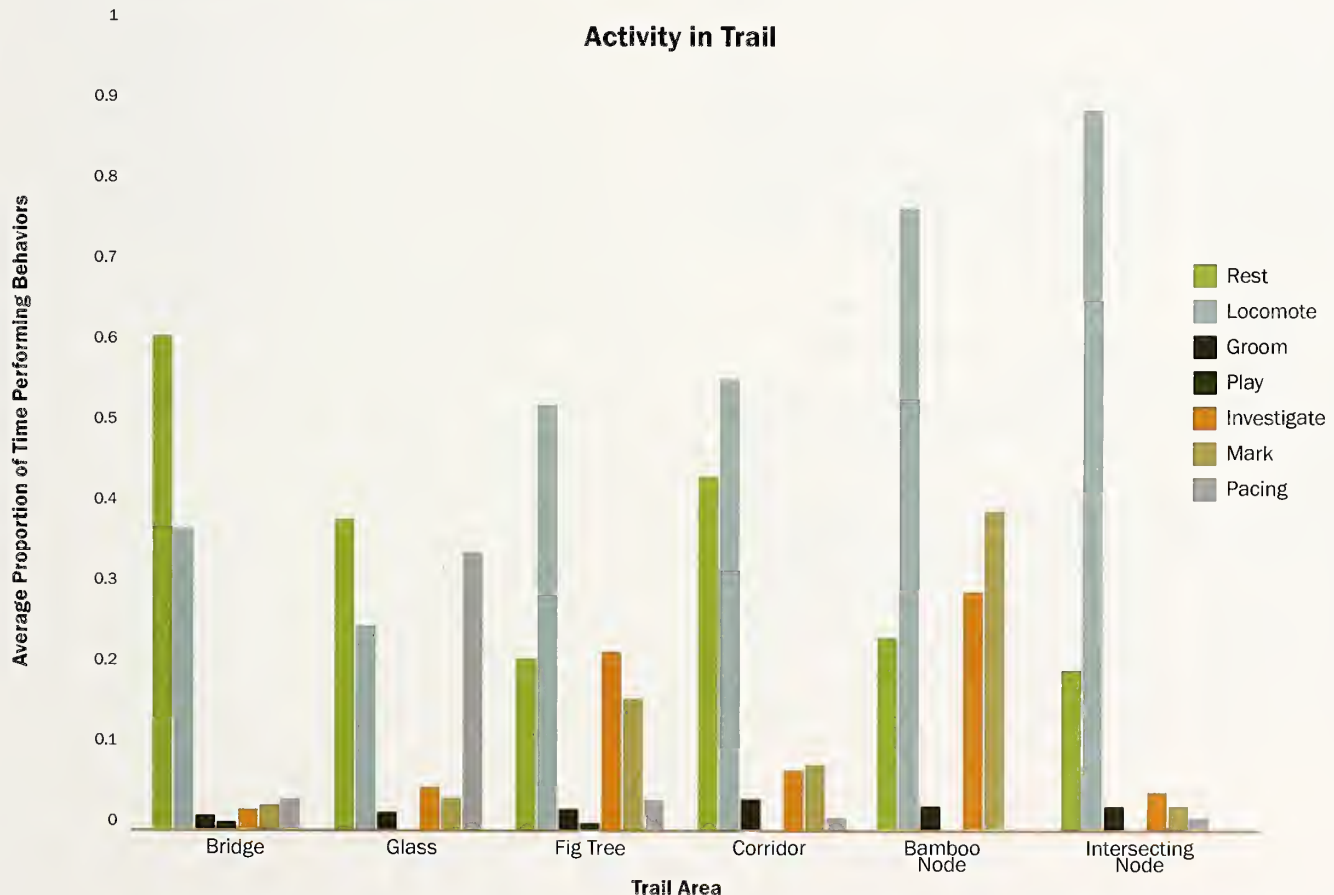
The tigers spent a larger proportion of time in the trail compared to the traditional exhibits ($p < 0.05$), and this preference held true for both the display of positive behaviors ($p < 0.05$; Graph 1) and pacing ($p < 0.05$; Graph 2). Compared to other areas of the trail, the glass bridge in particular was used less for the display of positive behaviors overall (Graph 1) and more for pacing (Graph 2). Conversely, the bamboo node in particular was used more for the display of positive behaviors (Graph 1) and less for pacing (Graph 2) compared to other areas of the trail. No significant difference was detected in the proportion of time that tigers spent locomoting while in the trails compared to the proportion of time they spent engaged in other behaviors within the trail ($p > 0.05$). However, the power of this test (0.2) was limited by the small sample size. Nonetheless, destination behaviors, such as resting (Graph. 3), clearly did occur in the trail spaces.

Discussion

Contrary to our prediction, tigers spent a larger proportion of their time in the trail than in the traditional exhibit space. Previous investigations suggested that zoo-managed tigers should be housed in large areas with pools, natural substrate, vegetation, resting areas and enrichment (Baldwin, 1991); so we believed that the tigers would use the trail as a pathway in order to seek out these features in the traditional exhibit spaces. This study's findings suggest that, while the tigers did utilize the traditional exhibit space, additional features offered by the Zoo's trail were equally if not more valuable for tigers when choosing where to engage in different activities. Possibly the trail was favored because it allowed the tigers to get a better view of interesting subjects, including prey species, other tigers, and the public, as well as allowed the tigers the opportunity to follow them. Furthermore, parts of the trail were raised, giving the tigers a dominant position relative to those other animals. Tigers naturally spend much of their time resting, interspersed with investigating and searching for prey and appropriate social contact (Resende et al., 2014; Seidensticker et al., 2010). The trail system facilitated those natural motivations by providing the tigers at the Jacksonville Zoo and Gardens with opportunities to move toward and away from prey species and conspecifics. However, the data further demonstrated that the utility of the trail was not limited to locomotion from one area to another. Rather, the trail also was the location where many other behaviors were performed (e.g., marking and investigating in the bamboo node; resting on the bridge). Overall, the positive behaviors were exhibited even more in the trails than in the traditional exhibit space.

The tigers also displayed most of their pacing, perceived as a negative behavior, in the trail. In an exhibit where tigers were exhibited in rotation with other Asian species, larger spaces produced more movement, and when in enclosures with little horizontal area, the tigers moved less (White et al., 2003). This is contrary to findings of the current study in which tigers paced more in the narrower trail than in the wider traditional exhibit. This suggests that the size of the space may not be the most important factor in determining tiger stereotypical movement. Carnivore pacing is related to their inability to control sensory access to social partners (Bashaw et al., 2007), and the trail has portions, including the glass bridge, that allow the tigers viewing into one of the adjacent tiger areas (Figure 3). Thus, while the tiger in the trail cannot come in contact with the adjacent tiger, conspecifics can be seen, heard, and smelled. Our management practice often resulted in exhibiting a different tiger in the adjacent exhibit. Therefore, pacing in the trail might have been affected by the presence of another tiger in the adjacent exhibit. In addition, maturation and separation of the littermates, as well as the female maturing and entering estrus and being paired for breeding may have elicited a prolonged period of increased pacing while the tigers reacted to changes in our husbandry procedures. Indeed, which conspecifics a tiger is able to contact can impact social behavior (Miller et al., 2011) and probably influence stereotypical behavior. Some of these potential pacing triggers are within our capability to manipulate for a desired goal. We may try housing our Malayan males adjacent to our Sumatran female to see if closer proximity and positive social interaction such as

Graph 3. Average proportion of time spent locomoting compared to engagement in other behaviors when tigers were in the trail system of the exhibit at the Jacksonville Zoo and Gardens.



chuffing would reduce pacing. Alternatively, we could obtain a Malayan female so that the males are less interested in the Sumatran female.

In order to reduce pacing when the Malayan and Sumatran males see each other, we might create more complex areas by adding logs, thus making it harder to pace in the areas where they are close to each other. Additionally, we may add positive habitat enhancement or enrichment options at the opposite end of the exhibit so that they are less focused on each other. This could take the form of mulch beds or other favorable resting materials, enrichment items on species-appropriate spring loaded anchors, or other interactive enrichment devices that will keep the tigers' attention for longer periods of time.

This study was completed in the winter months. It is possible that different results might be obtained in the summer when the temperatures are hotter. While pacing was prevalent in the winter, it may be too hot to pace as much in the summer, and instead more resting or even playing in the exhibit water area could be observed. Our tigers rested only 47% of the time (data not shown), much less than the duration of resting time in another study (76%; Pitsko 2003). While increased activity is favorable, especially from the perception of the public, we would prefer that the activities did not include stereotyped behavior.

Conclusion

This study showed that the tigers chose to spend the majority of their time in the trail system. As this is the most novel part of the innovative, complex habitat at Jacksonville Zoo and Gardens, the time tigers spent in the trail did give Zoo visitors many opportunities to see innovation in use. The hypothesis that the tigers would use the trail as a pathway more than as a destination was not supported. In fact, tigers chose to spend more time engaged in negative behaviors and positive behaviors, as well as locomotion, in the trail. Findings of this study suggest that we should make every effort to give all of our tigers access to the trail.

Acknowledgements

Thank you, Melissa O'Leary, for helping with data collection. Thank you to the Mammals Area 2 team for setting up the cats and providing Elana the time to participate in the study. Thank you to Jacksonville Zoo and Gardens management team for supporting our efforts in completing this study. We also thank the University of North Florida for their collaboration with the South-East Zoo Alliance for Reproduction & Conservation to support this internship opportunity.

Literature Cited


- Altmann, J. 1974. Observational Study of Behavior: Sampling Methods. *Behaviour* 49(3):227-266.
- Baldwin, R.F. 1991. Behavior of Carnivores in Outdoor Exhibits at the National Zoological Park. (Doctoral dissertation, George Mason University).
- Bashaw, M.J., A.S. Kelling, M.A. Bloomsmith, and T.L. Maple. 2007. Environmental Effects on the Behavior of Zoo-Housed Lions and Tigers with a Case Study of the Effects of a Visual Barrier on Pacing. *Journal of Applied Animal Welfare Science* 10(2):95-109.
- Miller, A., K.A. Leighty, M.A. Maloney, C.W. Kuhar, and T.L. Bettinger. 2011. How Access to Exhibit Space Impacts the Behavior of Female Tigers (*Panthera tigris*). *Zoo Biology* 30(5):479-486.
- Nowak, R.M. Ed. 1999. Walker's Mammals of the World. (Vol. 1). Sixth Edition. Baltimore: Hopkins University Press.

Pitsko, L.E.. 2003. Wild Tigers in Captivity: A Study in the Effects of the Captive Environment on Tiger Behavior. Virginia Polytechnic Institute and State University. Dissertation.

Resende, L.D.S., G.L.E. Neto, P.G.D. Carvalho, G. Landao-Remy, V.D.A. Ramos-Junior, A. Andriolo, and G. Genaro. 2014. Time Budget and Activity Patterns of *Oncilla* Cats (*Leopardus tigrinus*) in Captivity. *Journal of Applied Animal Welfare Science* 17(1):73-81.

Seidensticker, J., E. Dinerstein, S.P. Goyal, B. Gurung, A. Harihar, A.J.T. Johnsingh, A. Manandhar, C.W. McDougal, B. Pandav, M. Shrestha, J.L.D. Smith, M. Sunquist, and E. Wikramanayake. 2010. Tiger Range Collapse and Recovery at the Base of the Himalayas. *Biology and Conservation of Wild Felids*. Oxford University Press, Oxford, UK, 305-324.

Shepherdson, D., K.D. Lewis, K. Carlstead, J. Bauman, and N. Perrin. 2013. Individual and Environmental Factors Associated with Stereotypic Behavior and Fecal Glucocorticoid Metabolite Levels in Zoo Housed Polar Bears. *Applied Animal Behaviour Science* 14(2): 268-277.

White, B.C., L.A. Houser, S. Taylor, and J.L. Elliot. 2003. Activity-based Exhibition of Five Mammalian Species: Evaluation of Behavioral Changes. *Zoo Biology* 22(3):269-285. 



Follow Us!



[Facebook.com/AAZKinc](https://www.facebook.com/AAZKinc)



[Twitter.com/AAZKinc](https://twitter.com/AAZKinc)

BIG CAT INTERNSHIPS AVAILABLE



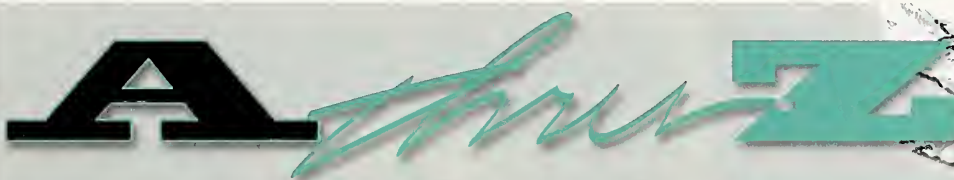
Join us in

"Saving Tigers One by One"
As seen on Animal Planet®
"Growing Up Tiger"

Learn about Big Cat Management. Internship involves
Animal Care Apprenticeship and Public Education.
We offer experience that counts towards employment.



TIGER MISSING LINK FOUNDATION • TIGER CREEK WILDLIFE REFUGE • Apply at: www.tigercreek.org



CONSULTING & DISTRIBUTING, INC.



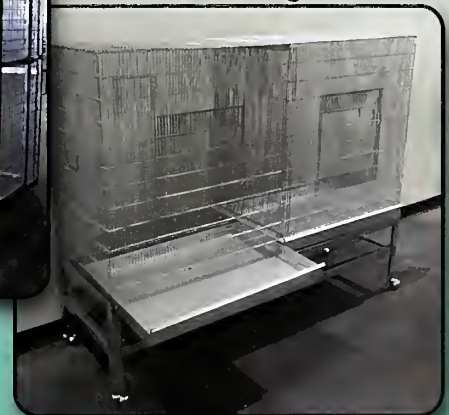
Cut & Clip
Class III Caging

Call us for all of
your caging
requirements!



Utility Caging

8620 E Old Vail Road, Suite 100
Tucson, AZ 85747
P: (520) 434-8281
F: (520) 434-0151
www.athruzcages.com



Find us on
facebook

ASSOCIATION
OF ZOOS &
AQUARIUMS

A Work of Passion

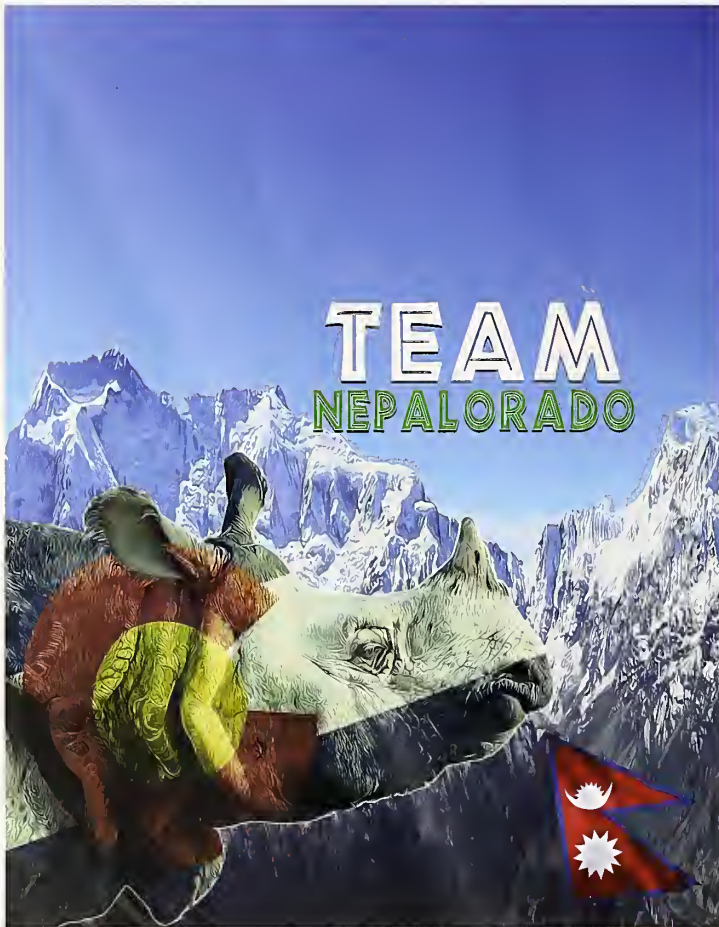
Dave Johnson, Zoo Keeper/Conservationist
Katie Adamson Conservation Fund
Denver, Colorado

I am a zoo keeper. Whenever someone asks me about my career that is the stock answer that I always get to utter with pride. I have been working with animals since I was fifteen-years-old. I was born to do this job, and I do not know why. When I was little, it was my birthday wish to always go to a zoo or national park to see animals more closely. Every birthday was the same and I just never could get close enough. I gave my pacifier to a spider monkey, ran alongside cheetah after climbing a public barrier, and stuffed crackers in all of my pockets so the deer would mob me in the deer park. My Mom got berated by staff because she could never control me around the animals. My art work was only wildlife, my television favorites were Wild Kingdom and Grizzly Adams, and my poor brother still needs counseling because of all the times I netted him with a shawl and tried to put a radio collar on him. Destiny called to me and I answered. I am a zoo keeper, and it is a job of passion that I am so very proud of.

My home now is Denver, Colorado, far removed from the mountains of North Carolina where I grew up, and the nature center that helped to mold me. That first job led to a mountain lion study and a degree in wildlife biology. My brother and I were both whitewater rafting guides and summer nature counselors. We grew up on the Appalachian Trail

and had a wander lust. I followed my heart around the country, from a wild animal park in South Carolina, to a bear job in Alaska, and on to a wildlife education center in Kentucky. Always the animals called to me, and I followed my passion with tumbleweed ease. Colorado ended up capturing my heart and my soul. The community here is uplifting, and the outdoors breathtaking. The zoo gave me a chance to find my new home and I wanted to make it amazing. This new home kindled something in my roaming heart, and I stayed. It then cultivated something else inside of me. It made the zoo keeper passion erupt, and it made the man in me want to make a bigger difference. When you are a zoo keeper, sometimes the passion gets the best of you and it takes you on journeys you never believed to be possible. Zoo keepers are dreamers and difference makers, and our zoo is packed full of them.

Before opening up a new pachyderm exhibit in Denver, I wanted to help our community grow and get excited about new species and wonderful new opportunities coming their way. I started running races to make conservation money for elephants and rhinos. I began writing children's conservation books about the animals I love. Then I began to lead people from our community over on amazing explorations of the wild world. In 2010 I ran my first marathon. It was in honor of our oldest elephant in Denver. She had lived in our zoo for a half century



and was a city darling. Then I took my first trip over to Nepal to start a conservation project for pachyderms. Seven times we have crossed over to share this experience with all who will follow. We call ourselves Team Nepalorado. It's a fusion of cultures in the name of conservation. It's a chance to divvy out the passion.

My first book came out in 2012 about our elephants and a little local girl named Sissy Sally Sassafras, who was a melting pot of all the little kids that come to our zoo excited about seeing the animals we care for. I see them every day. In them there is Sissy. In a frozen tent in Alaska I wrote poetry about her twenty years ago, dreaming of the day when I would make this heroine come to life. That next year I wrote a book about an orphaned rhino in Nepal that had captured our hearts. Her name was Narayani. This rhino and Sissy were going to be impactful in some way, I just felt it. We built a solar powered electric fence, bought anti-poaching motorbikes for the rangers, and are now building a wildlife vet hospital in Nepal. Part of this hospital is going to be an orphanage for rhinos, allowing us to give back to a species on the brink. When we started this project there were 10-12 rhino poaching incidents annually in Chitwan National Park. Now they have had only one poaching incident in the last four years. They are raising the bar for countries that are trying so desperately to save these last five species. Our team is so very proud of the strides that have been made and the partnerships that have been built.

We started climbing mountains for rhinos in our AAZK Chapter a few years ago. Now I lead people up our fourteeners every summer and this August we will be tackling Kilimanjaro for the first time. We will visit Mkomazi, the rhino orphanage in Tanzania, and begin protecting species on two continents. Now we will be covering both of our zoo rhino

species and helping to protect and educate about the greater one-horns and black rhinos of the world. We have eighteen people heading over to Africa for this next conservation initiative. We are creating a passion explosion and a conservation virus that is spreading amongst our people, it is glorious to witness.

Now I have my next book out. It is called "Zoodiac Kids" and it makes this a Sassafras Series. From elephants to rhinos, and now to global conservation strategies, Sissy Sally takes us on a mission of passion. Twelve animals picked as totems for people to follow and to help protect. Children can now be part of the solution and a big avenue of change. She is leading the charge. We are trying to get this book series sold in every state and make conservation the new cookie! I am partnering with kids, churches, schools, sports teams, and anyone else who wants to make a stand. We are asking for Rhino Warriors to step up to the plate and sell books for your peers instead of sweets. Profits will be split in half for any courageous follower of our mission.

Zookeeping is a passion and a career built on dreams and desire. Ask any keeper about their animals and about conservation and most will talk your ear off about their lemur, or gerenuk, or orangutan. We are a community gathering for a last big stand. We have a fight on our hands. We are no longer just rakers of yards, shovelers of dung, and hosers of barns, but now we are on the frontline of species protection and education. The future generations look to us for answers and for solutions. I am so very proud of my career and how my life has turned out as an animal nerd. Never be afraid to stand up for what you believe in, or question whether you can do more. It is part of what makes us who we are.

I am a zoo keeper and this career defines me. 🐘

Top: Team Nepalorado
Bottom: Photographing wild elephants.



The author in Kathmandu.





Enriching the Lives of Captive Wild Animals and the People Who Care For Them

Fire hose enrichment at the National Zoo.





Hose2Habitat workshop in Florida.



Zoos pick up items from Owens Corning treasure hunt.

Hose2Habitat is the only organization in the world whose mission is to improve the physical and psychological well-being of captive wild animals by providing and enhancing habitat enrichment for animals in zoos, sanctuaries, and other facilities through the donation of recycled and other materials, workshops, programs, and services. Hose2Habitat is 100% volunteer-operated and its materials, workshops, programs, and services are always free to help ensure that cost to a facility does not prevent benefit to animals. Hose2Habitat is proud to be an American Association of Zoo Keepers Conservation Partner and to extend its services to conservation projects and animal enrichment research.

Hose2Habitat was established in 2014 by Lisa Daly and Anthony Slamin. As volunteers with a county fire department, Daly and Slamin saw dumpsters full of fire hose taken to landfills after the fire hose no longer met regulations for use by the fire department. Daly noticed fire hose in use in an exhibit at the National Zoo and recognized a demand for the supply she knew was being wasted.

As Daly and Slamin spoke with zoo keepers and other professionals knowledgeable about the care of wild captive animals, they learned more about the challenges facing enrichment programs for these animals. This led Hose2Habitat to expand its donations

to other materials, such as plastic barrels, PVC pipe, street sweeper brushes, cargo nets, sheets and blankets, rope, and many other items.

In April 2015, Owens Corning and Hose2Habitat began to discuss how materials generated in Owens Corning facilities could be donated to zoos and sanctuaries for animal enrichment.

**To learn more about
Hose2Habitat, visit**

Facebook.com/Hose2Habitat

Hose2Habitat.org

**or contact Lisa Daly at
Lisa@Hose2Habitat.org.**

Officials from zoos and sanctuaries near Atlanta, Georgia, were consulted and invited to Owens Corning facilities in Atlanta and Fairburn for a treasure hunt to identify materials that could be diverted from landfills and used as habitat enrichment. A year later, over a dozen zoos in the United States and Canada were paired with local Owens Corning plants for ongoing donations with more pairings being

made every month. A Fortune 500 Company with facilities worldwide, Owens Corning is now committed to donating enrichment materials to zoos and sanctuaries globally through the Owens Corning/Hose2Habitat program.

In December 2015, Hose2Habitat held its first annual enrichment contest, allowing keepers and other zoo staff to choose the categories and prizes and to judge the contest which awarded prizes valued at more than \$1000. Hose2Habitat is now accepting ideas for the categories and prizes for its 2016 enrichment contest.

When discussing prizes for the enrichment contest, Hose2Habitat learned that enrichment workshops would be of interest and value to keepers and other zoo staff, so workshops were added to the services that Hose2Habitat offers. Guest leaders from Europe and the United States join Daly and Slamin to hold free, customized enrichment workshops at zoos, sanctuaries, and other facilities to help animal care professionals learn and share habitat enrichment skills and information.

Hose2Habitat is slowly adding to its small cadre of volunteers who are passionate about its mission. New initiatives, partnerships, programs, and projects continue to be developed and existing programs refined as the organization grows. 🐘

From Hay Tubs to Bollards: The Evolution of Chute Training for Grevy's Zebra

By Amanda Giardina, Lead Zoo Keeper, Hooves & Horns
Zoo New England, Franklin Park Zoo
Boston, Massachusetts

Introduction

Zoo New England's Franklin Park Zoo in Boston, Massachusetts, Grevy's zebras (*Equus grevyi*) training program began in 2007. The herd, 3.8 individuals in total, has been comprised of stallions, breeding females, foals and geriatric animals with diverse personalities and compliance levels. Grevy's are the largest and most aggressive subspecies of zebra, having a sometimes challenging disposition. Behavioral conditioning has helped us to manage the herd more efficiently and minimize the need for veterinary intervention.

Protected contact training takes place in an off-exhibit holding yard with chain-link fencing. The bridge used is a clicker, primary reinforcement

is apples, and some animals respond positively to tactile rewards, such as scratching. The two main goals for this program have been scale training to obtain monthly weights and presentation of a hip or shoulder for hand-injection. Environmental manipulation allowed development of a "chute," which evolved from upside down hay tubs to a new bollard design, to train for hand-injection and more complex behaviors.

Relationship Building and Scale Training

Prior to the start of formal conditioning, time was spent relationship building with individuals both in the barn and outside. Relationship building in the barn included standing outside individual stalls while the zebras ate their grain and offering treats when walking by. While

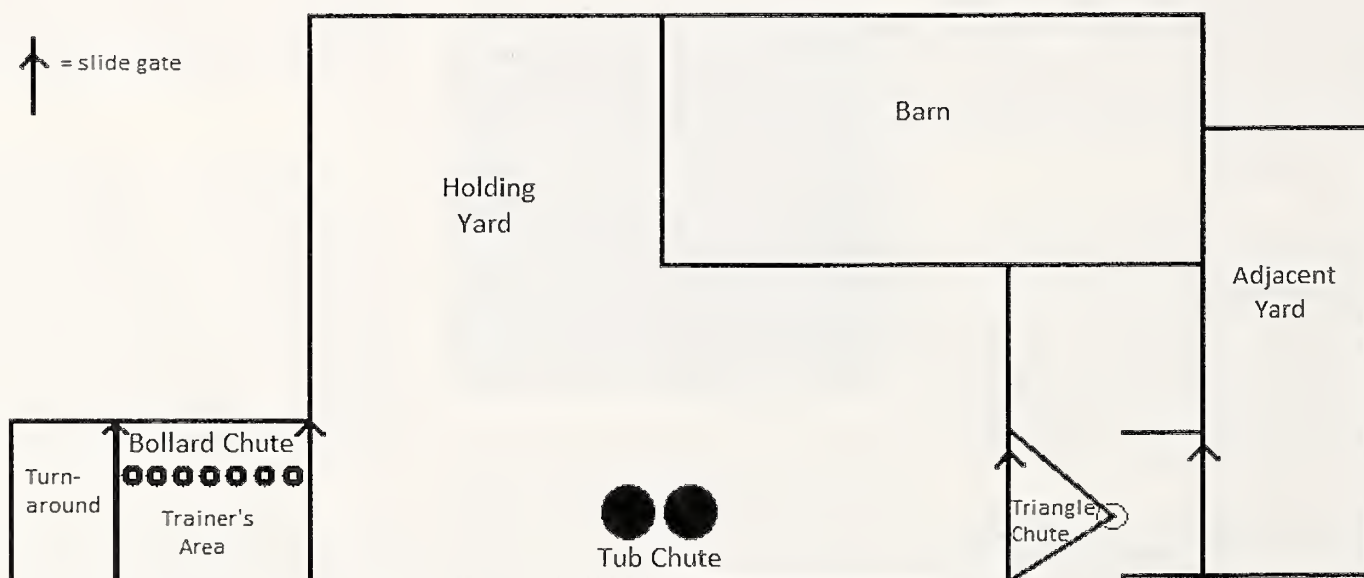


Figure 1: Yard Diagram



Targeting into tub chute. Photo by Kim Kezer.



Positioning cheek and neck present. Photo by Kim Kezer.

training in the yard, some of the more hesitant individuals grew more comfortable by observing their companions take treats.

Scale training took place in the barn. The zebras were desensitized to step onto a wooden platform with a piston scale underneath. As part of the desensitization process, the zebras were initially lured onto the platform using a tub of grain until all four hooves were on the platform. At this point, the grain was phased out and the verbal cue scale was added.

Early Tub Chute Design and Training

After establishing the scale behavior, station and target were established in preparation for shaping hip and shoulder. The behavioral criteria for hip and shoulder require the zebra to remain still while standing in a side present position, parallel to the fence line. To prevent the zebra from facing the trainer head-on, a chute was created using two large Fortex® hay tubs, flipped upside down. Tubs were placed side by side, initially two feet away from the fence line, and gradually moved closer to narrow the chute. Using a target, the zebras were guided into the chute and highly reinforced. Initially, the zebra was cued to back out while partially in the chute. As their comfort level improved, they were given a release cue to exit from the front.

Some of the animals were not comfortable being separated, creating a challenge when multiple animals were in the training yard. Using their proximity to one another unexpectedly turned out to be an advantage rather than a hindrance. While one zebra was in the chute, the second bonded zebra was stationed to face the trainer, essentially blocking the

first zebra from exiting the chute. To increase the duration and comfort level while in the tub chute, previously established behaviors such as open mouth or target were cued to shift their focus and provide more reward opportunities.

Once a behavior was established, the more motivated and independent zebras were trained to allow touching of the neck, shoulder, hip, and cheek. The tub chute facilitated this training by keeping the animal standing in a side present position subsequently desensitizing the animals to a hand on the mesh and then a dowel. Gradually the criterion was raised to press their cued body part towards the dowel and eventually against the fence, eliminating the dowel. The zebra was then trained to allow touch for increasing periods of time.

At this point, some zebras began to accept tactile as a form of reinforcement, while others just tolerated touch for the food reward. Using this simple tub chute to train shoulder and hip led to the successful hand-injection of vaccines for several of our Grevy's. The most obvious limitation of this design, however, was that the actual "chute" was not clearly defined and did not confine the animals to the training space.

Triangle Chute

The older zebras without relationship building as a part of their upbringing did not accept touch as willingly as the juveniles and were more likely to walk out of the tub chute when working on this behavior. Using gates from a chute between two holding yards we were able to create a triangular chute. These gates could be configured to create

a space for a zebra to be positioned for hand-injection. Acclimation to being closed into this area took 3-5 months, depending on the individual. While in this tight triangular area, the zebras were positioned with their hip already against the chain link, eliminating the need to desensitize them to being touched by a dowel or scratching. Instead, the animals were desensitized directly to a poke on the hip with a capped needle and syringe. The triangular chute was useful for accomplishing our goal and several animals were hand-injected their vaccines with this set up.

Bollard Chute

After a few years of the demonstrating the potential of this training program, a proposal was written for the construction of a bollard chute, allowing more tactile access to the animals for palpations and blood draws. Looking at available resources, a permanent chute was installed by modifying a pre-existing fenced area abutting the holding yard. Using measurements based on the size of our stallion, the chute was designed to be 2'2" wide x 6'10" long. One long side is made of chain link fencing while the other side is made of nine 2.5" diameter by 7'10" tall bollards, spaced 6 inches apart. A slide gate at the front of the chute gives zebras access to a small chain link fenced area for them to turn-around in. This turn-around space is a vital component, providing an area for the zebra to exit the chute, turn around and re-enter the chute facing the opposite direction, giving access to both sides of the zebra.

Introduction to the Bollard Chute:

Similar desensitization techniques we used in the new chute system, and progress varied per individual. One zebra, highly motivated by scratches as reinforcement, was closed in the chute in less than one week, while others took a few months. It has been important to be very aware of each individual's comfort level and not push for more advanced behaviors until they are motivated and ready.

Benefits, Accomplishments and current training in the bollard chute design:

The design and function of the chute has significantly advanced this training program's potential. We now have the ability to train more advanced behaviors that were thought to be impossible with our set-up and the species. Since the installation of the chute:

1. Zebras are trained in a more controlled environment without the concern of them walking away.
2. Trainers have better access to the animals to desensitize more of the zebra's body to touch, allowing vets to do close up visual and tactile exams.
3. Scratching as a reinforcer is facilitated because of the spacing between the bollards. This has improved the animal's willingness to enter the chute and move into the desired positions to earn these scratches.
4. Injection training has improved significantly. Before delivering the actual injection, we are able to scratch and tap the site, which makes them less reactive when receiving the injection. This approach was virtually impossible with the previous chute designs. With these improvements, there has been little regression in behaviors following vaccinations. Previously, it would sometimes take weeks or even months to re-establish shoulder or hip presentation.
5. We have been able to desensitize the neck to a blunted needle for jugular blood collection and are working on sticking with a sharp needle. We have not yet been successful with blood collection, but the bollard system has given us the opportunity to condition a behavior that was thought impossible with our previous set-ups.
6. Future training goals now include leg desensitization and hoof work.



Shoulder injection site. Photo by Kim Kezer.

Conclusion

Being the primary trainer for Zoo New England's Grevy's zebra program has been incredibly rewarding and an invaluable learning opportunity. Throughout the course of this program, it has been necessary to be creative and patient. It is a great feeling of accomplishment to start a program from the beginning and see that your time and effort has helped it to flourish. Each step of the way, the zebras learned skills that translated to the next phase of their training. This program has greatly benefited both the animals and the staff, creating a less stressful environment and increasing safety for all involved.

Acknowledgements

I would like to thank my editors, Kim Kezer, Training Coordinator, Christine Bartos, Assistant Curator, and Nicole Beaupre, former Senior Zoo Keeper; Pearl Yusuf, former Assistant Curator, for helping with the bollard chute design and John Piazza, Mammal Curator, for making it really happen. Thank you to my great Hooves & Horns crew for lending a hand whenever I needed it, especially my former secondary trainers, John Perakis and Kristin Cibotti. And thank you to all the Grevy's I've learned with over the years: Menelik, Evita, the kids, Daisy & Storm. 🐘

BHC comments by Jay Pratte:

The author has done a great job desensitizing a group of animals of varying ages and temperaments to the chute and side presentation system. It has enabled the facility to change how they manage their herd and individuals. Due to space constraints, some details had to be edited about the extensive desensitization process that the trainers thought their way through. If you have specific questions, definitely contact them at the facility for in-depth details.

I also really like how chute training evolved on a very real budget, something we all face at some time. Or all the time... The evolution also demonstrates great use of available space and resources. This Tale also shows us that when we demonstrate what we are capable of accomplishing, with few resources, we can encourage our facility to invest in further goals or program development.

It does become an interesting challenge, after a while, to edit and present Tales, and still provide fresh commentary. I try to look for a real take-home gem in every article to get readers thinking about the training process. In this Tale, that gem popped into my head on my drive to work, as it is something that we often see across species:

Behaviors do not usually generalize well.

Let me provide an example. Having trained a lion to present his right side for injections, you would think that then training the LEFT side for similar presentation would be easier. In many cases, this is not true. As in not even close. Changing things up might look like we are only



The Bollard Chute. Photo by Kim Kezer.

altering one variable from our perspective, but animals regularly act like it's a whole new ball game. So switching sides, changing chutes, sometimes introducing a new target can cause tremendous regression (I'm looking at you, giraffe...), and it is often more helpful to treat any significant changes as if they are new goals and behaviors. The author paid attention to the environment, used available resources well, and had a thorough desensitization process. The results were steady progress with all of the zebras throughout the changes. As always, we appreciate your Tales. Thank you!

Open mouth. Photo by Kim Kezer.



We want to hear your Training Tales – the good, the bad and the fabulous!

Please submit your "Training Tales" and experiences in operant conditioning to share with *Animal Keepers' Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network.

Please submit entries based on the following guidelines:

- ▶ Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:
 - Define the training goal (what did you try to do and for what purpose?)
 - List important steps (How did you do it – include plans that changed along the way/what worked and what didn't work)
 - Timeline used (how long did it take)
 - Tips you learned along the way
- ▶ Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.

Please send entries or questions to:

Kim Kezer at kkezer@zoonewengland.com or
Shane Good at shane.good@aazk.org
(use *Training Tales Submission* as the subject).

When a tiger roars in a forest and no one is around to hear it, does it make a sound?

Zoo keepers learning to eavesdrop on tigers may answer this question while helping save the species

Courtney Dunn

Executive Director of The Prusten Project
Senior Mammal Keeper at the Dallas World Aquarium
Dallas, Texas

Deep within the forest of Sumatra live a multitude of animals which rely primarily on vocal communication due to the dense vegetation blocking most visual confirmation. The Sumatran tiger (*Panthera tigris sumatrae*) is arguably one of the loudest animals in this environment, producing a call which can transmit several kilometers and reach up to 114 decibels (approx. 25 times louder than a gas-powered lawn mower.) Combined the various animal vocalizations could be likened to a symphony, each species being equated to a different instrument and adding a unique sound to the forest. This symphony, however, has had its instruments plucked one by one. Species have been disappearing at an alarming

rate and as soon as 2020, the tiger could be one of them.

Since the early 1990s, tiger populations of all subspecies have plummeted by over 50% throughout their shrunken ranges, currently only occupying 7% of their historic range (Seidensticker et al., 2001). Primarily responsible for this rapid decline is the growing illegal wildlife trade in various body parts from this species sold as health tonics and economic charms (Dinerstein et al., 2007). Habitat degradation and the increasing rate of prey depletion are also to blame. Functioning as a keystone species, all tiger subspecies indirectly manage forest ecosystems through prey control

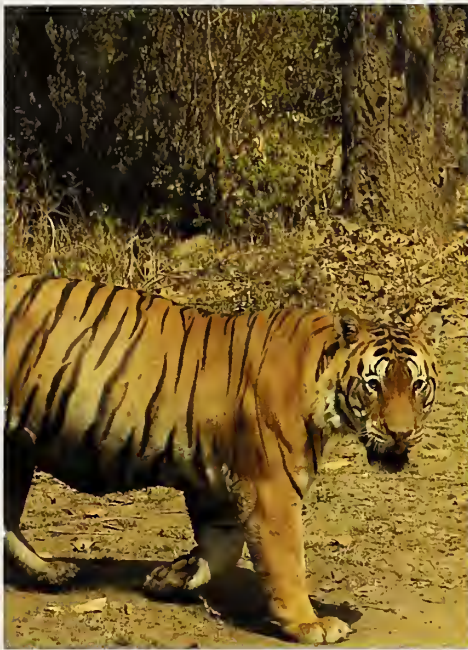
(Mills et al., 1993). The rapid disappearance of this keystone species is creating a measurable impact on the ecosystems they support and leaving researchers struggling to find a solution before it is too late.

Presently, most censusing involves humans actively tracking tigers on foot, looking for pug marks (commonly known as pawprints) (Sharma et al., 2003). These outdated tracking methods may cause more harm than good due to habitat invasion, disturbance and low efficiency (Karanth et al., 2003). Automatic cameras triggered by animal movement (a.k.a camera-traps) can provide more accurate information about tiger density, but here too there are inherent problems (e.g. tigers frequently cross a trap's path without a sufficient photo taken). Improved census techniques are essential and important for habitat protection and anti-poaching enforcement.

On the other hand, tigers seem to have no problem at all knowing exactly who and how many other tigers are in or near their territory (Leyhausen, 1969). Scent-marking of territories as well as visual marking through use of claws determine boundaries and carry information relevant to the territory holder. Since both of these behaviors allow communication at relatively close-range, how do they communicate over farther distances? The answer lies in their diverse vocalizations. Tigers use vocalizations common to other felids, including growling, hissing, and snarling (Vratislav, 1981). Outside of these common sounds, tigers produce a range of distinctive calls due to the unique anatomical adaptations

A Bengal tiger walks towards a stream in Kanha National Park, India. Photo taken by Courtney Dunn.





Members of The Prusten Project and Think for Tigers team have a close encounter with a male, Bengal tiger as he passes their jeep in Kanha National Park, India. Photo taken by Courtney Dunn.

of their species (Kelmuk et al., 2011). The distinctive calls are prusten, moans, true roars, and coughing roars (Ulmer, 1966). A coughing roar mainly occurs during a close-range attack or fight. On the other hand, prusten, moaning, and true roaring occur exclusively in friendly circumstances such as greeting other individuals or searching for a mate (Peters and Leyhausen, 1999).

What if instead of reinventing the wheel, researchers were to “hack” the tigers’ methods of communication in order to better understand and track their populations? The Prusten Project came into existence to answer this basic question by determining if individual tigers do have unique vocalizations perhaps correlated with sex, age, or other individual-related attributes which could lead to new methods of remote acoustic monitoring. But, how exactly do you record tigers when you have no idea where to find them?

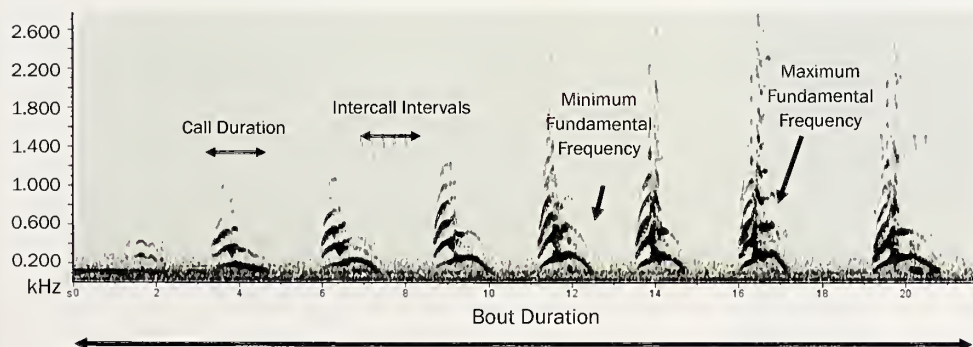
This is where the use of zoos entered the equation. “Zoo keepers are constantly looking for ways to contribute to conservation,” stated Tiffany Mill, Cat Keeper at the Erie Zoo. “We don’t just want to come to work and look at animals we love, knowing that one day there will be none left in the wild.” It was from this thought and many others like it that a database of captive tiger vocalizations began to form within AZA zoological institutions. Facilities collaborated amongst each other by mailing Songmeter SM2s, a brand of recorder produced by Wildlife Acoustics, to each other to continue the chain of recording. Carl Moher, Animal Keeper II at the Dallas Zoo, pointed out visitors were “very inquisitive as to why the keepers were carrying a small green box during tiger shifting.” Many zoos took this as an opportunity to educate guests on the plight of the tiger by incorporating the research into their talks. The Downtown Aquarium of Denver displayed training signs, illustrating which tiger was being recorded that day and why. Erie Zoo’s Director, Scott Mitchell, took it one step further and invited local media in to learn about their zoo’s participation. Sumatran, Amur (*P. tigris altaica*) Malayan (*P. tigris jacksoni*), and Bengal tigers were each recorded for 72 straight hours before having their vocalizations processed by volunteers using a sound analysis program known as Raven Pro (<http://www.birds.cornell.edu/brp/raven/ravenoverview.html>).

The first portion of the study, focused on Bengal tigers (*P. tigris tigris*), showed the sex of members of this subspecies could be identified with over 90% accuracy by comparing the aforementioned characteristics. Distinct individuals could also be identified with 60% accuracy. This apparent complexity of tiger vocalizations could potentially enable a vocal “fingerprint” to be assigned to individuals, which, in turn would allow for vocal monitoring as well as censusing when using microphone arrays placed strategically over tigers’ home ranges. Although the study is still a work in progress with the other subspecies of tigers, the results have been promising thus far. “It

has shown we need to think outside of the box and utilize what is directly presented to us such as vocalizations and sounds,” explained Carl Moher. “Every day, the tigers I work with produce a multitude of acoustics and I always wonder what each tone, frequency, and volume translates to.”

Acoustic monitoring such as this also has the possibility to contribute to conservation in many other ways. Lora Baumhard, Mammal Supervisor at the Dallas Zoo, points out it could “potentially help catch poachers, in addition to learning more about other species.” Once set up in a forest, the recorders are able to capture a multitude of sounds which collectively make up something known as a soundscape. The soundscape includes birds, amphibians, mammals, and of course poaching activity or illegal logging. An all-inclusive piece of equipment such as this could also revolutionize field research by allowing biologists to crowdsource their data, collaborating in ways never thought possible.

As The Prusten Project continues to work on protecting tigers in the field, the zoo keepers who have made this research possible are also continuing to give a voice to the animals they care for. “Being able to share information with guests and other staff about how the animals they come to see and learn about help their wild counterparts means that I’m better able to do my job of helping bring awareness to the general public,” said Kristyn Hayden-Ortega, Animal Keeper at Topeka Zoological Park. Tiffany Mill also points out “it really hits home when the visitors can see the animals in front of them, and hear how one day they might not be able to.” The project has also provided professional development for the keepers themselves. “It afforded me an opportunity to bring an organization working with real-world conservation techniques into our zoo and allowed our resident tigers to contribute to a database of auditory recordings,” Jenna Schmidt, Carnivore Keeper at the Tulsa Zoo explained. “It has opened lines of communication to other keepers involved in the project, which has led to some great professional contacts and learning opportunities.”



Although the future may seem grim for many endangered species, zoo keepers have shown hope for the tiger can arise from even the smallest of collaborations even if those collaborations occur countries away from the tiger’s native range. “By using our resources that are available to us, we are able to potentially help save the species we all care and love,” remarked Tiffany Mill. “With the right drive, anything can happen.”

Membership Has Its Benefits!



Membership with the American Association of Zoo Keepers includes a subscription to the *Animal Keepers' Forum*, member rates for AAZK events and products, access to the Members Only section of aazk.org, plus much more!



Join today at
AAZK.ORG

References

- Dinerstein, E., C. Loucks, E. Wikramanayake, J. Ginsberg, E. Sanderson, J. Seidensticker ... and P. Leimgruber. 2007. The fate of wild tigers. *BioScience* 57(6):508-514.
- Karanth, K.U., J.D. Nichols, J. Seidensticker, E. Dinerstein, J.L.D. Smith, C. McDougal...and V. Thapar. 2003. Science deficiency in conservation practice: the monitoring of tiger populations in India. *Animal Conservation* 6(2):141-146.
- Klemuk, S, T. Riede, E. Walsh, and I.R. Titze. 2011. Adapted to roar: functional morphology of tiger and lion vocal folds. *PLoS ONE* 6(11).
- Leyhausen, P. 1969. The communal organization of solitary mammals. *Zoological Society of London Yearbook* 379-393.
- Peters, G. and B. Tonkin-Leyhausen. 1999. Evolution of acoustic communication signals of mammals: friendly close-range vocalizations in Felidae (Carnivora). *Journal of Mammalian Evolution* 6(2):129-159.
- Seidensticker, J, S. Christie, and P. Jackson. 2001. Tigers, humans, and the face of conservation. *Conservation Biology* 15(1):292-293.
- Sharma, S, Y. Jhala, and V. Sawarkar. 2003. Gender discrimination of tigers by using their pugmarks. *Wildlife Society Bulletin* 31(1):258-264.
- Ulmer, F.A. 1966. Voices of the Felidae. *International Zoo Yearbook* 6:259-262.
- Vratislav, M. 1981. *Panthera tigris*. *Mammalian Species* 152:1-8 



Lyon ProCare Critical Care Units

The Lyon ProCare CCU assists veterinary professionals in providing the best oxygen therapy care to a variety of small animals.

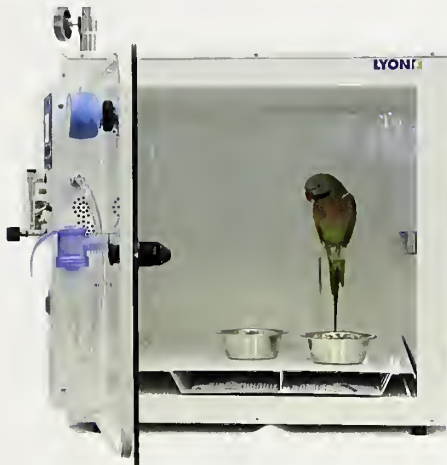
Designed with leading practitioners to meet the demanding needs of Critical Care and proven by years of actual use in veterinary hospitals, emergency clinics, teaching hospitals, rescue facilities and zoos.

The goal of oxygen supplementation is to increase the oxygen concentration of inspired air, improve blood oxygenation, and increase tissue delivery of O₂.

Lyon's Intensive Care Units are great for avian and exotic patients because they are low stress and noninvasive. It is the go to unit for thousands of veterinary professionals world wide.



ProCare CCU 24 912-103



ProCare CCU 18 912-120

DIMENSIONS:

ProCare CCU 18: 22 ¼ W x 22 H x 23 D P/N 912-120

ProCare CCU 24: 28 ¼ W x 27 H x 23 D P/N 912-103

ProCare CCU 36: 40 ¼ W x 27 H x 23 D P/N 912-104

ProCare CCU 48: 52 ¼ W x 33 H x 25 D P/N 912-140

ProCare CCU 60: 66 ¼ W x 39 H x 31 ½ D P/N 912-119

*All dimensions are in inches by Width X Height X Depth

*Specifications subject to change without notice

STANDARD FEATURES

- 5 Sizes
- Double Walled, Insulated all Metal Construction
- Powder Coated for Superior Durability
- Digital Display
- Relative Humidity Display, Monitoring and Alarm
- Passive Cooling System
- Oxygen Induction System
- CO₂ Scrubbing
- Easy Lift Removable Door
- Auxiliary Access Port(s) depending on unit size
- IV Tube Access with Integrated Bag Holder
- Interior LED Lighting
- Nebulizer System
- Removable Floor
- Optional Cart with Storage Shelf and Casters
- Lyon TrueDimension™ Sizes are Actual Interior Useable Space
- Oxygen Inlet Terminated with DISS 1240 Male Adapter




8476 E. Speedway Blvd.
Suite 204
Tucson, AZ 85710-1728
U.S.A.

"Dedicated to
Professional Animal Care"



 facebook.com/AAZKinc

 @AAZKinc

ADDRESS SERVICE REQUESTED



*****AUTO**3-DIGIT 200

P1 S7
Smithsonian Institution
Library - Nhb 25 MRC 154
PO Box 37012
Washington DC 20013-7012

Sound Nutrition for Nature's Royalty



Central Nebraska Packing, Inc. offers:

Classic & Premium Frozen Carnivore Diets

• ALSO AVAILABLE •

HORSE SHORT LOINS / HORSE & BEEF BONES

MEAT COMPLETE WITH TAURINE (RAW MEAT SUPPLEMENT FOR ALL CARNIVORES)

MEMBER: AZA | AAZV | AAZK

NEBRASKA BRAND



877.900.3003 | 800.445.2881

P.O. Box 550, North Platte, NE 69103-0550
info@nebraskabrand.com • nebraskabrand.com

FELINE & SENIOR FELINE | BIRD OF PREY | CANINE | SPECIAL BEEF FELINE